

# CLAIMS

## What Is Claimed Is:

- 1 1. In a chemical vapor deposition method, the improvement comprising the steps  
2 of;  
3 supplying a liquid material to be deposited;  
4 supplying a carrier gas;  
5 entraining the liquid material in the carrier gas to provide a gas-liquid mixture  
6 at a first pressure level; and  
7 releasing the gas-liquid mixture to a second pressure level sufficiently lower  
8 than the first pressure level to provide a total gasification of the gas-liquid mixture  
9 whereby a gas can be used for vapor deposition.
- 1 2. The invention of Claim 1 further including the step of heating the liquid  
2 material.
- 1 3. The invention of Claim 2 further including the step of heating the gasified  
2 mixture as it is released.
- 1 4. The invention of Claim 2 wherein the liquid material is supplied radially  
2 inward to a mixing chamber with the carrier gas.
- 1 5. The invention of Claim 2 wherein the gas-liquid mixture is released from a  
2 restricted orifice in a nozzle member.
- 1 6. The invention of Claim 2 wherein the liquid material is subject to a  
2 temperature of approximately 70°C to 80°C.
- 1 7. The invention of Claim 6 wherein the liquid material is selected from a group  
2 consisting of ethanol, trimethyl phosphate and pentaethoxytantalum.
- 1 8. The invention of Claim 7 wherein the carrier gas is an inert gas.

1 9. A system for providing a controlled amount of a gas from a liquid source,  
2 comprising:

3 a source of liquid;

4 a source of a carrier gas;

5 a control valve for mixing the liquid with the carrier gas and gasifying the  
6 liquid including a release nozzle,

7 a first conduit from the source of liquid to the control valve;

8 a regulator unit attached to the first conduit to control the flow of liquid;

9 a second conduit from the source of carrier gas to the control valve; and

10 a control unit connected to the regulator unit and the control valve for  
11 controlling the production of gas, the control valve regulating the quantity of liquid  
12 and mixing the carrier gas with the liquid at a first pressure level greater than a second  
13 pressure level downstream of the release nozzle whereby the liquid mixed with the  
14 carrier gas is gasified with the assistance of the pressure differential.

1 10. The invention of Claim 9 further including a heater unit connected to the  
2 control valve to heat the liquid.

1 11. The invention of Claim 10 further including a second regulator unit for  
2 controlling the flow of carrier gas and the control unit controls the second regulator  
3 unit.

1 12. The invention of Claim 9 further including a central mixing chamber in the  
2 control valve and a valve member that seats on a valve seat around the central mixing  
3 chamber whereby the liquid is introduced radially inward to the mixing chamber by  
4 the control valve.

1 13. The invention of Claim 12 whereby the control valve includes a reservoir for  
2 receiving the liquid that is radially outward from the valve seat.

1 14. The invention of Claim 13 wherein a heater unit is connected to the control  
2 valve to heat the liquid.

- 1 15. A control valve for gasifying a reactant liquid in a carrier gas for  
2 transportation, comprising;  
3 a valve body having a valve seat;  
4 a valve member for controlling the opening of the valve seat;  
5 a liquid inlet port for connection to a source of reactant liquid;  
6 a liquid reservoir positioned operatively on one side of the valve seat and  
7 connected to the liquid inlet port;  
8 a carrier gas inlet port for connection to a source of carrier gas;  
9 a mixing chamber positioned operatively on the other side of the valve seat  
10 and connected to the carrier gas inlet port; and  
11 a nozzle member with a restricted orifice connected to the mixing chamber  
12 wherein the valve member controls the delivery of liquid to the mixing chamber and  
13 the nozzle member releases the mixture of carrier gas and liquid reactant from the  
14 mixing chamber through the restricted orifice so that the liquid reactant is gasified  
15 when the pressure in the mixing chamber is sufficiently larger than the downstream  
16 pressure.
- 1 16. The invention of Claim 15 wherein the valve body has a heater unit for heating  
2 the liquid.
- 1 17. The invention of Claim 15 wherein the valve body includes a diaphragm with  
2 a rigid outer perimeter.
- 1 18. The invention of Claim 15 wherein the reservoir is radially outward from the  
2 valve seat and the mixing chamber is radially inward from the valve seat whereby the  
3 valve member controls the inward flow of liquid to the mixing chamber.
- 1 19. The invention of Claim 18 wherein the mixing chamber is an elongated  
2 groove.
- 1 20. The invention of Claim 18 further including a discharge conduit from the  
2 nozzle member that is heated.

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